Rapid Ecological Assessment for the Superior Coastal Plain Ecological Landscape

An Inventory and Analysis of Rare Plants and Animals and High-quality Natural Communities in Support of a Master Plan

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Cover Photos from top left: Lake Superior at Port Wing Boreal Forest SNA (Heather Kaarakka), clay bluffs and boreal forest along the Sioux River (Ryan O'Connor), northern flying squirrel on paper birch (Paul White), American bittern (Jack Bartholmai), Michaux's sedge (*Carex michauxiana*) in Great Lake shore fen (Ryan O'Connor).

Table of Contents

List of Tables

List of Figures

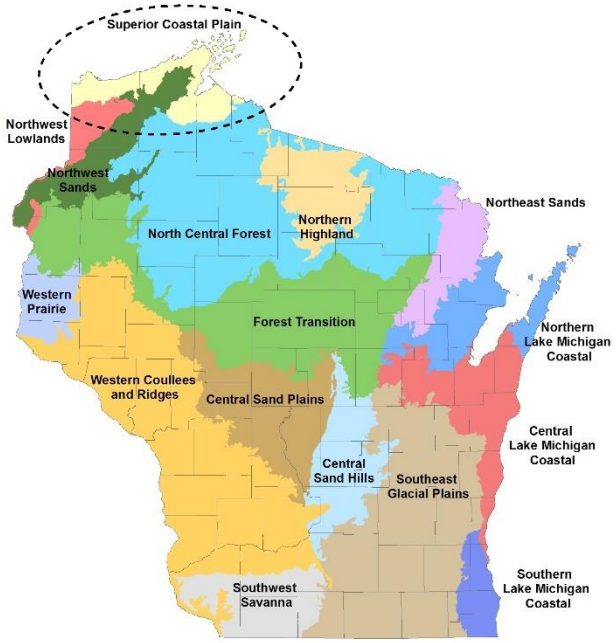
List of Maps

Introduction

Purpose and Objectives

This report is intended to be used as a source of information for developing the master plan for the Superior Coastal Plain Ecological Landscape (SCP EL, Map A).

The primary objectives of this project were to collect biological inventory information relevant to the master plan for properties in the SCP EL and to analyze, synthesize and interpret this information for use by the master planning team. This effort focused on assessing areas of documented or potential habitat for rare species and identifying natural community management opportunities.



Map A. Ecological Landscapes of Wisconsin.

Surveys for the SCP EL were conducted in 2017 and 2018 and focused on 1) identifying and evaluating ecologically important areas, including re-evaluating previously designated Primary Sites, 2) documenting or updating rare species occurrences, and 3) documenting or updating occurrences of high quality natural communities. This report serves as the "Biotic Inventory" document used for master planning. There will undoubtedly be gaps in our knowledge of the biota of this property, especially for certain taxa groups; these groups have been identified as representing either opportunities or needs for future work. Inventory data collected through this effort is a starting point for adaptive management of properties in the SCP EL and should be revisited periodically and updated when new information becomes available.

This inventory was limited to properties being actively planned that had not previously been inventoried by the Wisconsin DNR's Bureau of Natural Heritage Conservation (NHC) (Table 1). Previous inventories also relevant to the SCP EL should be consulted as necessary for a more complete assessment of the conservation opportunities for properties in the Superior Coastal Plain (Table 2).

Table 1. Properties included in the Superior Coastal Plain EL rapid ecological assessment.

Bark Bay Slough SNA
Big Bay State Park
Lost Creek Bog SNA
Nourse Sugar Bush SNA
Port Wing Boreal Forest SNA
South Shore Lake Superior Fish and Wildlife Area

Table 2. Properties in the Superior Coastal Plain EL inventoried through previous NHI biotic inventory and rapid ecological assessments.

Property	Planning Group	Year Surveyed
Amnicon Falls State Park	Amnicon Fall and Pattison State Parks Planning Group (WDNR 2011)	2009
Bibon Swamp SNA	White River Planning Group (WDNR 2010)	2008
Brule River State Forest	Brule River State Forest (WDNR 2016)	2014-2016
Copper Falls State Park	Copper Falls State Park (WDNR 2009)	2007-2008
Pattison State Park	Amnicon Fall and Pattison State Parks Planning Group (WDNR 2011a)	2009
Pokegama-Carnegie Wetlands SNA	St. Louis River Planning Group (WDNR 2014b)	2013
St. Louis River Streambank Protection Area	St. Louis River Planning Group (WDNR 2014b)	2013
White River Fishery Area	White River Planning Group (WDNR 2010)	2008
White River Wildlife Area	White River Planning Group (WDNR 2010)	2008

Overview of Methods

The Wisconsin Natural Heritage Inventory (NHI) program is part of the Wisconsin DNR's Bureau of Natural Heritage Conservation (NHC) and is a member of an international network of natural heritage programs representing all 50 states, as well as portions of Canada, Latin America, and the Caribbean. These programs share certain standardized methods for collecting, processing, and managing data for rare species and natural communities. NatureServe, an international non-profit organization (see *www.NatureServe.org* for more information), coordinates the network.

Natural heritage programs track certain elements of biological diversity: rare plants, rare animals, high-quality examples of natural communities, and other selected natural features. The NHI Working List (WDNR 2018) contains the elements tracked in Wisconsin. They include endangered, threatened, and special concern plants and animals, as well as the natural community types recognized by NHI. The NHI Working List is periodically updated to reflect new information about the rarity and distribution of the state's plants, animals, and natural communities. The most recent Working List is available from the Wisconsin DNR website (*Wisconsin Natural Heritage Working List*).

The Wisconsin NHI uses standard methods for biotic inventory to support master planning. Our general approach involves collecting relevant background information, planning and conducting surveys, compiling and analyzing data, mapping rare species and high quality natural community locations into the NHI database, identifying ecologically important areas, and providing interpretation of the findings through reports and other means.

Existing NHI data are often the starting point for conducting a biotic inventory to support master planning. NHC's biotic inventory projects typically start with a coarse-filter assessment, followed by targeted surveys for priority taxa, then data processing, analysis and report writing. Survey scope and intensity corresponds to the study area size and ecological complexity, as well as resource availability.

Field surveys for the EL were focused on documenting high quality natural communities, rare plants, breeding birds (including forest raptors), invertebrates (primarily bumblebees), small mammals, and

herptiles (Table 3). The collective results from these surveys were used, along with other information, to identify, evaluate, and update ecologically important areas (Primary Sites) of the SCP EL.

Table 3. Survey Targets and Methods for Biotic Inventory on the Superior Coastal Plain EL in 2017-2018.

Survey Target	Surveyors	Methods
Animals		
Forest Raptors	NHC Staff	Broadcast call surveys for northern goshawk and red-shouldered hawk in likely habitat.
Breeding Birds	NHC Staff	Surveys followed Wisconsin Breeding Bird Atlas II protocols. Emphasis placed on areas not covered by Atlas blocks.
Herps	NHC Staff	Calling surveys for frogs; visual encounter searches for turtles, snakes, lizards, salamanders, and frogs; egg mass surveys in ephemeral ponds.
Small Mammals	NHC Staff	Transects with Sherman traps in conifer and mixed conifer – hardwood forests targeting woodland jumping mouse, woodland deer mouse, northern flying squirrel, and near streams or waterbodies for water shrew.
Rare plants	NHC Staff	Meander surveys targeting peatlands, other wetlands, dry-mesic, and dry forests. Kayak surveys for rare aquatic plants.
Natural Communities	NHC Staff	Meander surveys focused on characteristic species, community boundaries, threats and management issues.

Survey locations were identified or guided by using recent aerial photos, USGS 7.5' topographic maps, various Geographic Information System (GIS) sources, information from past survey efforts, discussions with property managers, and the expertise of several biologists familiar with the properties or with similar habitats in the region. Based on the location and ecological setting of properties within the SCP EL, key inventory considerations included the identification of oak and pine forests, boreal forest, barrens, peatlands, high-quality open and shrub-dominated wetlands, softwater lakes, stream corridors, and the location of habitats that had the potential to support rare species. Private lands, including easements, were not surveyed.

In this report, the first mention of plant species and invertebrate animals in the text is followed by scientific names in parentheses. Plant nomenclature follows the Wisconsin State Herbarium (WIS). Vertebrate animals follow standard common names.

For a description of the geology, historical vegetation, and current vegetation of the Superior Coastal Plain EL, please see Chapter 21 of the Ecological Landscapes of Wisconsin (dnr.wi.gov, keyword Ecological Landscapes).

Management Considerations and Opportunities for Biodiversity Conservation

The Ecological Landscapes of Wisconsin highlights eight major conservation and management opportunities for the Superior Coastal Plain Ecological Landscape (WDNR 2014a). These are summarized below, and a list of Primary Sites are presented under each item as examples. This list of sites is not meant to be exhaustive. Property planners and managers may identify important resources outside of primary sites by consulting the NHI Portal, NHI Biotic Inventory survey data or contractor reports, NHC District Ecologists, and other resources noted in the subsections below.

The Apostle Islands: Sandscapes, Maritime Forests and Cliffs

The Apostle Islands are one of the largest island complexes on the largest freshwater lake in the world. The sandscapes, forests and barrier beach lagoons are some of the least disturbed and most diverse ecosystems on the western Great Lakes. The natural community mosaic includes some of the most extensive pine forests in this ecological landscape, beaches and dunes, interdunal wetlands, and a wide array of marshes, fens, sedge meadows, and bogs. These natural communities in turn support diverse floras that include many rare plants. In poorly drained areas, ephemeral ponds are present. At a few locations, the old-growth forests have a strong boreal character, with spruce and fir dominant, sometimes mixed with northern white-cedar and yellow birch. Sandstone is exposed as cliffs and ledges and provides habitat for highly specialized plants. One state property was inventoried in 2017-2018 that falls within the Apostle Islands archipelago:

- Big Bay State Park on Madeline Island (see Big Bay Sand Spit and Bog and Big Rock Point primary site)

Freshwater Estuaries and Coastal Wetlands

The southwestern portion of the Lake Superior basin contains more high-quality coastal wetlands than any other region in the Great Lakes. Many wetlands are associated with drowned river mouths or barrier beach lagoons and are considered freshwater estuaries. These host a complex and distinctive mosaic of natural communities. Each estuary is bordered by a sandspit and often supports natural communities that are restricted to the shores of the Great Lakes, such as Great Lakes beach, Great Lakes dune, and Great Lakes shore fen, and these are often bordered by poor fen, northern tamarack swamp, northern sedge meadow, alder thicket, and other peatland communities. The mature pine forests occurring on several of the larger sandspits are also of very high significance regionally because they are sparse elsewhere in the ecological landscape, support rare plants and nesting birds, and receive heavy use as stopover sites by migratory birds. Properties inventoried in 2017-2018 with good examples of inland freshwater estuaries and coastal wetlands include:

- Bark Bay Slough SNA (see primary site description)
- Big Bay State Park (see Big Bay Sand Spit and Bog and Big Rock Point primary site)
- Lost Creek SNA (see primary site description)
- South Shore Fishery Area - Flag River Unit and the Port Wing Boreal Forest SNA (see Port Wing Boreal Forest SNA and Bibon Lake primary site)
- South Shore Fishery Area – Sioux River Unit (see Sioux River Bayview Beach primary site)
- South Shore Fishery Area – Fish Creek Unit (see Fish Creek Estuary primary site)

Clay Plain Boreal Forest

On either side of the rugged Bayfield Peninsula, the Superior Coastal Plain's heavy red clay soils historically supported one of northern Wisconsin's most distinctive forest communities. Dominant trees included white spruce, eastern white pine, balsam fir, and white birch. Important associates included quaking aspen, northern white-cedar, and balsam poplar. The Cutover and subsequent fires of the late 19th and early 20th centuries produced a second-growth forest with few conifers, virtually no large trees, and vast expanses of aspen, sometimes mixed with white birch. Portions of this ecological landscape represent the best potential to restore missing elements of the boreal forest such as more conifer representation, large trees, snags, coarse woody debris, patches of old growth forest, large forest patches, and a reduction of the hard edge that is now prevalent throughout much of this region. A property inventoried in 2017-2018 with a good example of boreal forest is:

- South Shore Fishery Area – Pikes Creek Unit (see Upper Pikes Creek Boreal Forest primary site)

Red Clay Wetlands

Areas in and around the city of Superior are characterized by poorly drained, heavy red clay soils that often support wetland vegetation, even on sites locally occupying the higher elevations. The most common wetland cover types in these areas are shrub swamps, sedge meadows and marshes. Uncommon cover types or features of these red clay wetlands include ponds or small pools, springs, and remnant conifer swamps. Ecologically, the red clay wetlands are most remarkable for the unusual flora they support. Many rare species have been documented in these habitats, including a number of plants that occur nowhere else in Wisconsin and several that are rare globally. No sites were inventoried in 2017-2018 with good examples of red clay wetlands, but previous work on the SCP EL identified them at Pokegama-Carnegie Wetlands SNA (WDNR 2014b).

River Corridors

The largest rivers of the SCP EL originate in regions to the south and west. The floodplains and associated terraces of the St. Louis, Bad, and Nemadji rivers support examples of communities that are generally scarce this far north. Smaller rivers and streams, including the Amnicon, Brule, Flag, Iron, and Sioux rivers and Fish Creek provide important breeding habitat, foraging areas, and travel corridors for many native species. Maintaining or restoring the most appropriate vegetation cover to these corridors will not only enhance these habitats but stabilize streambanks and reduce the quantities of sediments that are transported to Lake Superior. Corridors that tend to run north-south may be especially important for migratory species such as birds. Properties inventoried in 2017-2018 with good examples of river corridors include:

- South Shore Fishery Area – Fish Creek Unit (see Fish Creek Estuary primary site)
- South Shore Fishery Area – Pikes Creek Unit (see Upper Pikes Creek Boreal Forest primary site)
- South Shore Fishery Area – Sioux River Unit (see Sioux River Big Rock Pines primary site)
- South Shore Fishery Area – Iron River Unit

Migratory Bird Concentration Areas

Large numbers of migratory birds move through the Superior Coastal Plain Ecological Landscape (Steele 2007, Grveles et al. 2011). Wisconsin Point, for example, is used by large numbers of passerines and raptors, especially during the spring migration. Chequamegon Bay also hosts large numbers of waterfowl, other waterbirds, and shorebirds. Heavy flights of passerines have been documented in the Apostle Islands in the fall, and large numbers of raptors have also been noted moving through the archipelago. Shorebirds, waterfowl, loons, grebes, gulls, and terns may be present in large numbers during both the spring and fall. Smaller but still significant concentrations of migratory birds occur at some of the other

coastal estuaries, such as the mouth of Bark Bay, Port Wing, Fish Creek, and the mouth of the Brule River. Examples of sites surveyed in 2017-2018 with important habitat for migratory birds include:

- South Shore Fishery Area – Fish Creek Unit (see Fish Creek Estuary primary site)
- Bark Bay Slough SNA (see primary site description)
- South Shore Fishery Area - Flag River Unit and the Port Wing Boreal Forest SNA (see Port Wing Boreal Forest SNA and Bibon Lake primary site)

Colonial Birds: Terns, Gulls, Cormorants

Important bird colonies occur on small islands in Chequamegon Bay, the Apostle Islands archipelago, and in the St. Louis River Estuary. For example, the common tern (state endangered) nests at only two sites on Lake Superior, both within the Superior Coastal Plain. The tern colonies are monitored annually by Wisconsin DNR staff from the Bureaus of Wildlife Management and Natural Heritage Conservation. Other colonial nesters have been monitored at annual or five-year intervals since 1974. Besides common terns, the monitored species include black tern, great blue heron, double-crested cormorant, herring gull, and ring-billed gull. No sites were inventoried in 2017-2018 that supported colonial nesting bird colonies, but they are known from other department-managed sites including Wisconsin Point and Tern Island.

Old-growth Forests and Clay Seepage Bluffs

Though small stands of old-growth forest occur in the SCP EL, this formerly abundant stage in forest development is now extremely rare. Old-growth stands demonstrate unique structural and compositional features and are needed for a wide variety of ecological and socioeconomic reasons (WDNR 2006). On the Bayfield Peninsula, Nourse Sugarbush SNA features one of northern Wisconsin's best examples of a sugar maple-basswood forest with old-growth characteristics.

Clay Seepage Bluffs occur where clay is exposed at many locations in the steep-sided valleys of streams running to Lake Superior. The highest quality clay bluffs are located where mid-slope groundwater seepage allows for the development of wetland vegetation. However, highly unstable sites subject to repeated slope failures, are often devoid of any vegetation or dominated by weeds and are lower in quality.

Properties inventoried in 2017-2018 with good examples of these opportunities include:

- Old-growth forests: Nourse Sugar Bush SNA (see primary site description)
- Clay seepage bluff: South Shore Fishery Area – Iron River Unit

Wildlife Action Plan Implementation and the Superior Coastal Plain Ecological Landscape

Conservation Opportunity Areas

Conservation Opportunity Areas (COAs) are places in Wisconsin that contain ecological features, natural communities, or SGCN habitat that present the greatest likelihood of successfully implementing conservation actions when viewed from the global, continental, upper Midwest, or state perspective. Several COAs occur in the SCP EL.

Opportunities for Natural Community Conservation

Opportunities for sustaining natural communities in Ecological Landscapes were developed in 2005 by the Ecosystem Management Planning Team (EMPT, published in 2007) and later focused on wildlife Species of Greatest Conservation Need and their habitat in the Wisconsin Wildlife Action Plan (WDNR 2015). The goal of sustaining natural communities is to manage for natural community types that 1) historically occurred in a given landscape and 2) have a high potential to maintain their characteristic composition, structure, and ecological function over a long period of time (e.g., 100 years). This list can help guide land and water management activities so that they are compatible with the local ecology of the Ecological Landscape while maintaining important components of ecological diversity and function. Based on EMPT's criteria, these are the most appropriate community types that could be considered for management activities within each Ecological Landscape.

The Wisconsin Wildlife Action Plan (WDNR 2015) identifies 32 natural communities for which there are "High" or "Moderate" opportunities for protection, restoration, or management on the Superior Coastal Plain Ecological Landscape (Table 4). For information on conservation actions that are beneficial for these communities, please refer to the Wisconsin DNR website, keyword "Wildlife Action Plan".

Table 4. Natural Communities that occur on properties inventoried in 2018 with High or Moderate Opportunities for Protection, Restoration or Management in the Superior Coastal Plain Ecological Landscape (WDNR 2015).

Community Type	
Alder Thicket	Lake Superior
Aspen-Birch	Mesic Floodplain Terrace
Bedrock Shore	Moist Cliff
Black Spruce Swamp	Muskeg
Boreal Forest	Northern Dry Forest
Clay Seepage Bluff	Northern Dry-mesic Forest
Coldwater streams	Northern Hardwood Swamp
Coolwater streams	Northern Sedge Meadow
Dry Cliff	Northern Mesic Forest
Emergent Marsh	Northern Tamarack Swamp
Floating-leaved Marsh	Northern Wet Forest
Floodplain Forest	Poor Fen
Great Lakes Beach	Riverine Mud Flat
Great Lakes Dune	Shrub-carr
Great Lakes Shore Fen	Submergent Marsh
Interdunal Wetland	Warmwater Rivers

Opportunities to Conserve Species of Greatest Conservation Need (SGCN) and Rare Plants

The Wisconsin Wildlife Action Plan also notes Species of Greatest Conservation Need (SGCN; WDNR 2015) associated with each Ecological Landscape. Species of Greatest Conservation Need are animals that have low and/or declining populations that need conservation action. They include various birds, fish, mammals, reptiles, amphibians, and invertebrates (e.g., dragonflies, butterflies, and freshwater mussels) that:

- Are already listed as threatened or endangered;
- Have few, low, or declining populations, and/or threats their populations or habitats;
- Are stable in number in Wisconsin, but declining in adjacent states or nationally;
- Have biological, genetic or ecological characteristics that place them at risk or make them vulnerable to decline.

There are 72 SGCN and 54 rare plants highly or moderately associated with the Superior Coastal Plain Ecological Landscape. This means that these species are significantly associated with the EL, and that restoration of natural communities with which these species are associated would significantly improve their conditions.

The Wisconsin Wildlife Action Plan also identifies conservation opportunities by highlighting the natural communities in each Ecological Landscape that are most important to the SGCN. While many communities that occur on the SCP EL have major or important conservation opportunities, some of these communities support more

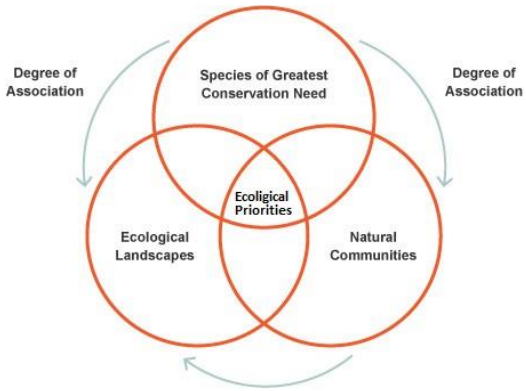


Figure 1. Diagram of ecological priorities based on the Wildlife Action Plan.

SGCN and rare plant species than others (Figure 2). For example, northern sedge meadows and boreal forests support a significant number of rare species. Although all of these rare species do not necessarily occur on DNR properties, natural communities with higher species counts provide a disproportionate benefit to a greater number of SGCN and rare plants across the SCP EL and may warrant special consideration in the master planning process. This intersection of SGCN and rare plants with priority natural communities represents the best opportunities for management on the SCP EL from an ecological and biodiversity perspective. For a complete list of which SGCN are associated with the Superior Coastal Plain Ecological Landscape, please see the Wisconsin Wildlife Action Plan website (https://dnr.wi.gov/, keyword "Wildlife Action Plan"), or for species associated with specific natural communities, see the natural community pages (https://dnr.wi.gov/, keyword "Natural Communities").

Taxa and species-specific conservation opportunities in the Superior Coastal Plain EL include:

Significant Wildlife of the SCP EL

- This is the best place in the state to manage for and restore boreal forests and associated wildlife such as Swainson's thrush, Canada warbler, and Cape May warbler.
- Significant populations of wood turtles are found in many streams and rivers flowing into Lake Superior.
- Many important species occur in and are at least partially dependent on the extensive coastal wetlands such as American bittern.
- Beach and dune habitats support numerous rare species like nesting piping plover, Franklin’s ground-squirrel, and the hairy-necked tiger beetle.
- This area often has an influx of birds from more northerly regions during winter, especially owls, finches, Gyrfalcon, and Bohemian waxwing.
- Native brook trout and the uncommon "coaster" brook trout are associated with coldwater streams entering Lake Superior, as are some introduced salmonids.
- Several rare invertebrates are associated with boreal peatlands, such as the forcipate emerald and incurvate emerald dragonflies.

Significant Flora of the SCP EL

- A northern tamarack swamp supports the only known location in the state for the state-endangered fly honeysuckle (*Lonicera involucrata*).
- Stream-side alder thickets support the only known remaining population of the state-endangered auricled twayblade (*Listera auriculata*).
- Great Lakes shore fens and adjacent communities associated with coastal estuaries and barrier beach lagoons support the state's best populations of rare wetland plants like coast sedge (*Carex exilis*), Michaux's sedge (*Carex michauxiana*), and brown beak-rush (*Rhynchospora fusca*).

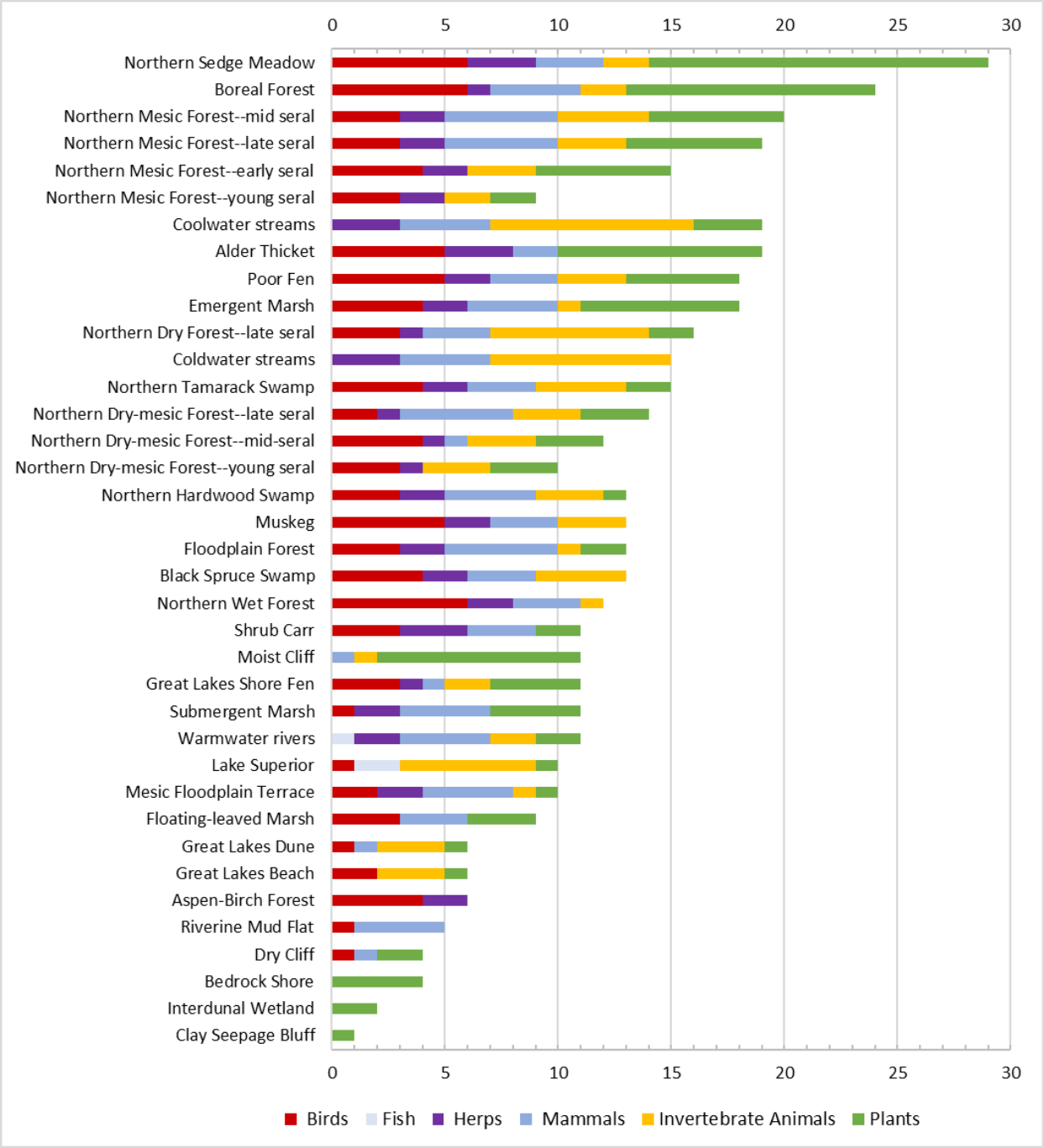


Figure 2. Number of SGCN and Rare Plants Highly or Moderately Associated with Natural Communities that have High or Moderate Opportunities for Protection, Restoration or Management in the Superior Coastal Plain Ecological Landscape.[1]

[1] Figure represents the SGCN and rare plants that are moderately or highly associated with the respective natural communities. Species and natural communities represented are limited to those that are moderately to highly associated with the Superior Coastal Plain Ecological Landscape.

Primary Sites: Site-specific Opportunities for Biodiversity Conservation

Nine ecologically important sites were identified on the Superior Coastal Plain Ecological Landscape (SCP EL) during surveys in 2017-2018. These "Primary Sites" were delineated because they generally encompass the best examples of:

1) Rare and representative natural communities,
2) Documented occurrences of rare species populations, and/or
3) Opportunities for ecological restoration or connections.

Table 5. Superior Coastal Plain Rapid Ecological Assessment Primary Sites based on 2018 surveys.

Code	Primary Site Name
SCPEL01	Port Wing Boreal Forest SNA and Bibon Lake
SCPEL02	Bark Bay Slough SNA
SCPEL03	Lost Creek Bog SNA
SCPEL04	Nourse Sugar Bush SNA
SCPEL05	Upper Pikes Creek Boreal Forest
SCPEL06	Big Bay Sand Spit and Bog and Big Rock Point
SCPEL07	Sioux River Bayview Beach
SCPEL08	Upper Sioux River Big Rock Pines
SCPEL09	Fish Creek Estuary

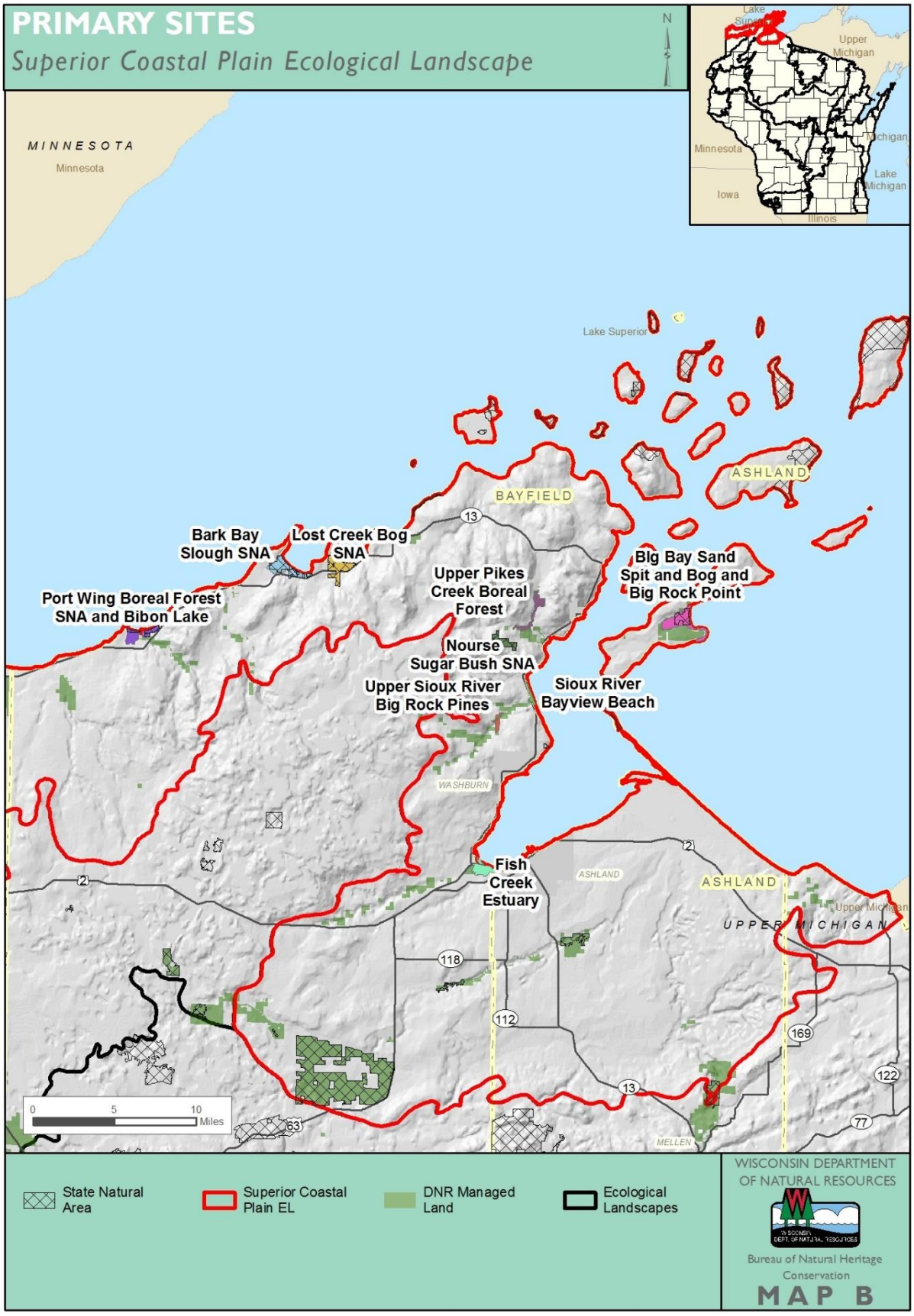
These sites warrant high protection and/or restoration consideration during the development of the property master plan. This report is meant to be considered along with other information when identifying opportunities for various management designations during the master planning process.

Primary Sites are also considered High Conservation Value Forests (HCVFs) for the purposes of Forest Certification, which requires the identification and periodic monitoring of HCVFs. All DNR-managed lands, including state forests, parks, wildlife and fishery areas, and natural areas are certified. Certified forests are recognized by the Forest Stewardship Council (FSC) and the Sustainable Forestry Initiative (SFI) as being responsibly managed (Forest Stewardship Council 2009).

Information provided in the summary paragraphs below includes location information, a site map, summary of the natural features present, important plant and animal species, the site's ecological significance, and management considerations.

The Primary Sites described below are in addition to the sites identified during other Rapid Ecological Assessments and Biotic Inventory Reports that occur within or partially within the Superior Coastal Plain Ecological Landscape. These include:

- Amnicon Falls and Pattison State Parks Planning Group (WDNR 2011)
- Brule River State Forest (WDNR 2016)
- Copper Falls State Park (WDNR 2009)
- St. Louis River Planning Group (WDNR 2014b)
- White River Planning Group (WDNR 2010)


PRIMARY SITES
Superior Coastal Plain Ecological Landscape
N
MINNESOTA
Minnesota
Lake Superior
Upper Michigan
Minnesota
Lake Michigan
Iowa
Illinois
Lake Superior
ASHLAND
BAYFIELD
13
Bark Bay Slough SNA
Lost Creek Bog SNA
Big Bay Sand Spit and Bog and Big Rock Point
Upper Pikes Creek Boreal Forest
Port Wing Boreal Forest SNA and Bibon Lake
Nourse Sugar Bush SNA
Upper Sioux River Big Rock Pines
Sioux River Bayview Beach
WASHBURN
2
Fish Creek Estuary
ASHLAND
ASHLAND
Upper Michigan
UPPER MICHIGAN
118
112
169
122
13
77
63
MELLEN
0 5 10 Miles
State Natural Area
Superior Coastal Plain EL
DNR Managed Land
Ecological Landscapes
WISCONSIN DEPARTMENT OF NATURAL RESOURCES
Bureau of Natural Heritage Conservation
MAP B

SCPEL01. PORT WING BOREAL FOREST SNA & BIBON LAKE

Location

Property:	Port Wing Boreal Forest SNA and South Shore Fishery Area-Flag River Unit
Landtype Association:	Douglas Lake-Modified Till Plain (212Ya01) and
	Bayfield Lake-Modified Till Plain (212Ka02)
Approximate Size:	577 acres

Description of Site

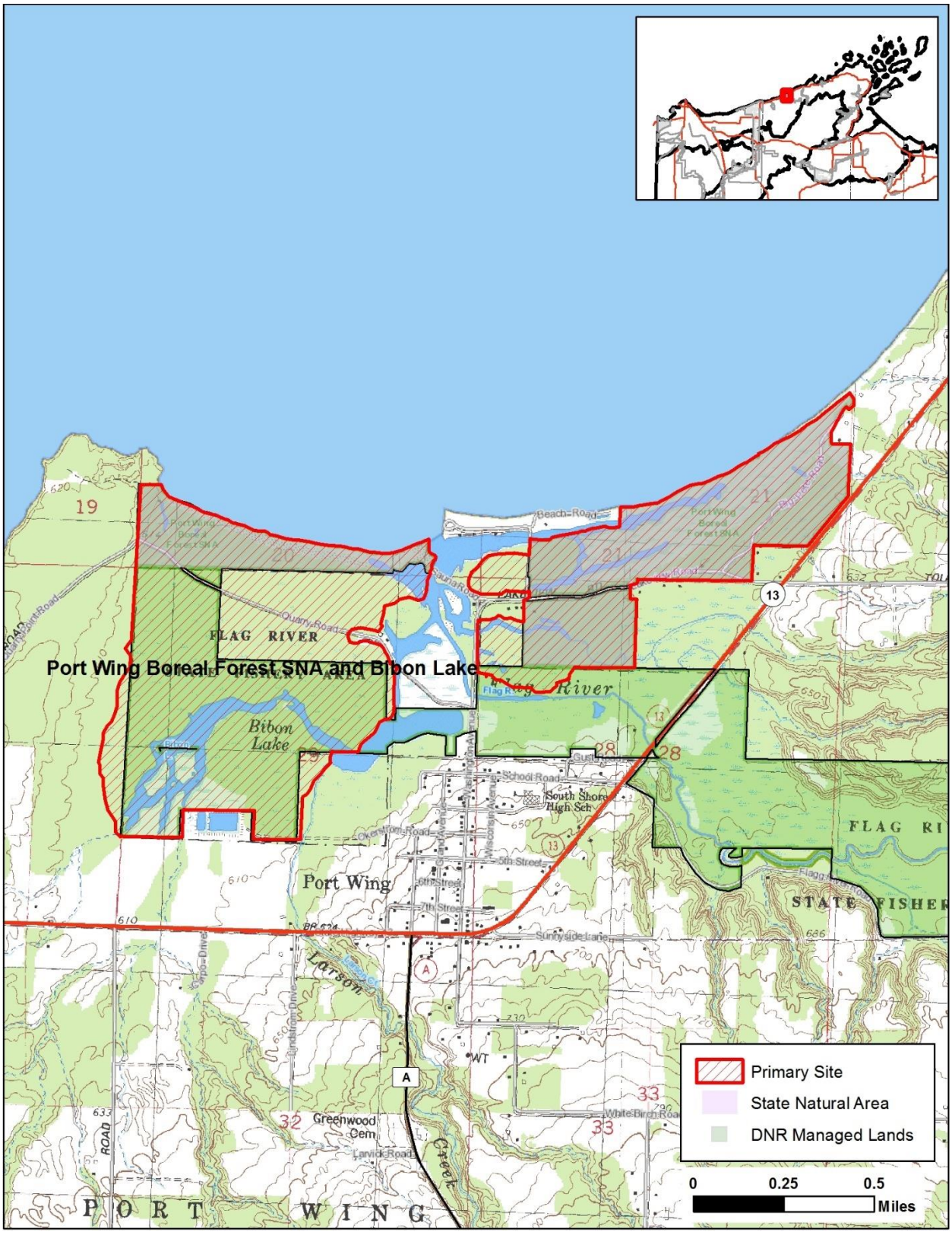
Port Wing Boreal Forest SNA encompasses two areas of mature conifer forest on sand spits adjacent to Lake Superior separated by the Flag River and Port Wing Marina. Bordering the forests is a high-quality wetland complex comprising the Flag River estuary, which extends beyond the SNA into the Flag River Unit of the South Shore Fishery Area. The forests have boreal characteristics and are dominated by large white and red pines as well as white spruce, balsam fir, red maple, white birch, mountain maple, yellow birch, and white-cedar. The wetlands include Great Lakes shore fen with a floating sedge mat, poor fen with a grounded Sphagnum-sedge mat, alder thicket, and northern tamarack swamp. The complex contains typical fen and bog species. A small 20-acre beach and dune complex stretches for three-quarters of a mile along the Lake Superior shoreline on the west side of the Flag River mouth.

Significance of Site

This site encompasses both remnant boreal and northern dry-mesic forests as well as a high-quality wetland complex. The wetland complex includes one of only ten high-quality Great Lakes shore fen sites in the state and supports several rare plants, as well as a northern tamarack swamp that contains the only known record in the state of a state endangered plant. The forests are mature with very large trees and a complex, multi-layered canopy that supports a wide variety of bird life, including a rare neotropical migrant that only breeds in dense, mature coniferous northern forests. Resident birds in the forest are very diverse and include veery, blue-headed vireo, northern parula, blackburnian warbler, as well as three Special Concern wetland birds. The mature forests of the site support important habitat for a special concern mammal along with red-backed vole and woodland deer mouse, a species with information needs. Port Wing Boreal Forest SNA was designated as an SNA in 1979 and is located within the Coastal Headlands and Estuaries Conservation Opportunity Area (COA), globally significant for its extensive shoreline and pristine wetlands and downed river mouths along the southern shore of Lake Superior (WDNR 2008). It is also part of the South Shore Wetlands Important Bird Area (IBA) (Steele 2007).

Management Considerations

Recent wind events have blown down some of the largest trees in the eastern unit of the forest, which were salvaged to reduce the threat of fire. Thousands of conifer seedlings were handplanted in resulting gaps to enhance regeneration and long-term forest composition. Deer browse is a concern on both planted seedlings as well as on the state endangered plant in the tamarack swamp. Substantial portions of the Great Lake shore fen near Bibon Lake have converted to non-native cat-tail, likely due to excess nutrient inputs. The source of nutrients is unknown but could be related to the former sewage lagoons south of the site or upstream agricultural practices, which comprise 20% of the Bibon Lake watershed. Management of both wetland and upland invasive species should be a priority. Forest invasives include hemp-nettle (*Galeopsis tetrahit*), particularly in the blow-down area. The beach and dune receive moderate levels of foot traffic by beach goers; use of motorized vehicles on the beach and dune is prohibited due to the thin vegetative cover over highly erodible soils and designation as an SNA. However, illegal use of motorized vehicles on the beach remains an issue.



SCPEL01. Port Wing Boreal Forest SNA and Bibon Lake Primary Site

SCPEL02. BARK BAY SLOUGH SNA

Location

Property:	Bark Bay Slough SNA
Landtype Association:	Bayfield Lake-Modified Till Plain (212Ka02)
Approximate Size:	846 acres

Description of Site

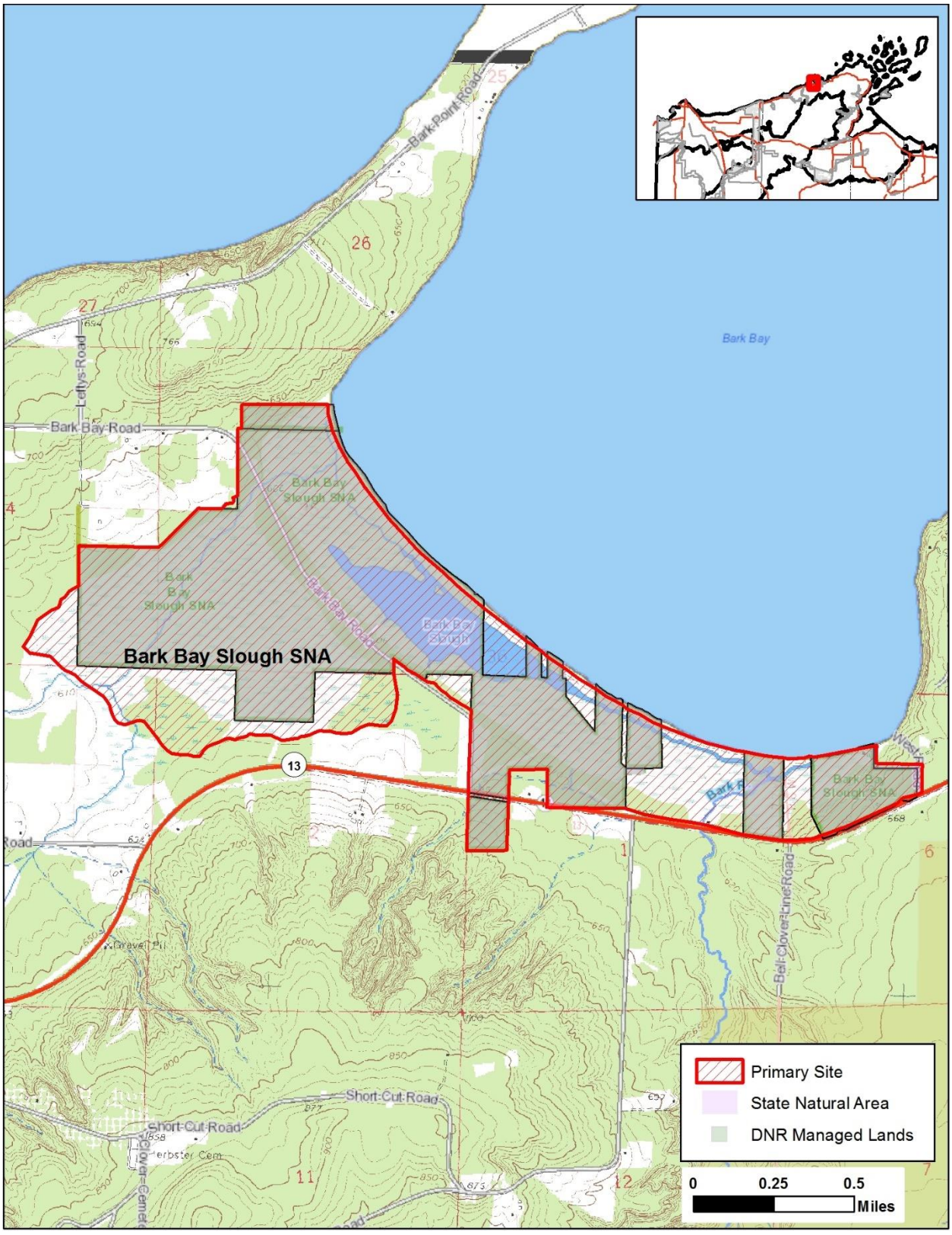
Bark Bay Slough SNA consists of a coastal barrier spit, lagoon, springs, and wetlands occupying an embayment between two rocky headlands along Lake Superior. The wetlands are extensive and include two major types: Great Lake shore fen and poor fen. The shore fen dominants are woolly sedge, twig rush, sweet gale, water horsetail and buckbean. The poor fen is composed of a mat of Sphagnum mosses, ericaceous shrubs, sedges, carnivorous plants and scattered small tamarack. Both communities are floristically diverse, in excellent condition and support many rare species. A forested interior sand spit parallel to the coastal barrier spit (or bay-mouth bar) breaks the wetlands into two major sections. The sandy, 2-mile long barrier spit contains red pine and white pine with an understory of blueberry, bearberry, alder, sweet gale, and beach grasses. A large lagoon occupies the center of the site and supports submergent and floating-leaved aquatic plants. Together, the wetlands and 28-acre lagoon form a bay-mouth bar lake. The shallow (maximum depth of eight feet), hardwater lake supports mostly panfish and northern pike. The Bark River and a spring complex on the eastern end of the natural area supply water to the lake and wetlands.

Significance of Site

Bark Bay supports one of only four Great Lakes shore fens on state-owned land in the Lake Superior basin and is one of the largest and highest-quality examples of this unique plant community. The site supports numerous rare plants and animals, including two state threatened species. Birds present during the breeding season include bald eagle, sandhill crane, and several rare species. Substantial numbers of migrating shorebirds also make use of the property. Bark Bay Slough was designated a State Natural Area in 1977 and is located within the Coastal Headlands and Estuaries COA, globally significant for its extensive shoreline and pristine wetlands and downed river mouths along the southern shore of Lake Superior (WDNR 2008). It is also part of the South Shore Wetlands IBA, known for a diverse suite of breeding birds as well as concentrations of shorebirds, diving ducks, and landbirds and raptors during migration (Steele 2007).

Management Considerations

The previously stated objectives of this SNA are to manage the site as a reserve for shore fen, tamarack swamp, and submergent/ emergent marsh, as an aquatic reserve and wetland protection site, as rare plant habitat, and as an ecological reference area. Natural processes determine the structure of the forest and wetlands. The native species should be managed passively, allowing nature to determine the ecological characteristics of the site. Exceptions include control of invasive plants and animals, maintenance of existing facilities, and access to suppress fires. Salvage of trees after a major wind event is not considered compatible with management objectives. Although removal of hazardous trees from over and near the boat launch is an allowed activity, manipulation/removal of vegetation and soil disturbance should be minimized to the extent possible. Roadside and utility easement areas may be managed sporadically by state, township and utility.



SCPEL02. Bark Bay Slough SNA Primary Site

SCPEL03. LOST CREEK BOG SNA

Location

Property:	Lost Creek Bog SNA
Landtype Association:	Bayfield Lake-Modified Till Plain (212Ka02)
Approximate Size:	858 acres

Description of Site

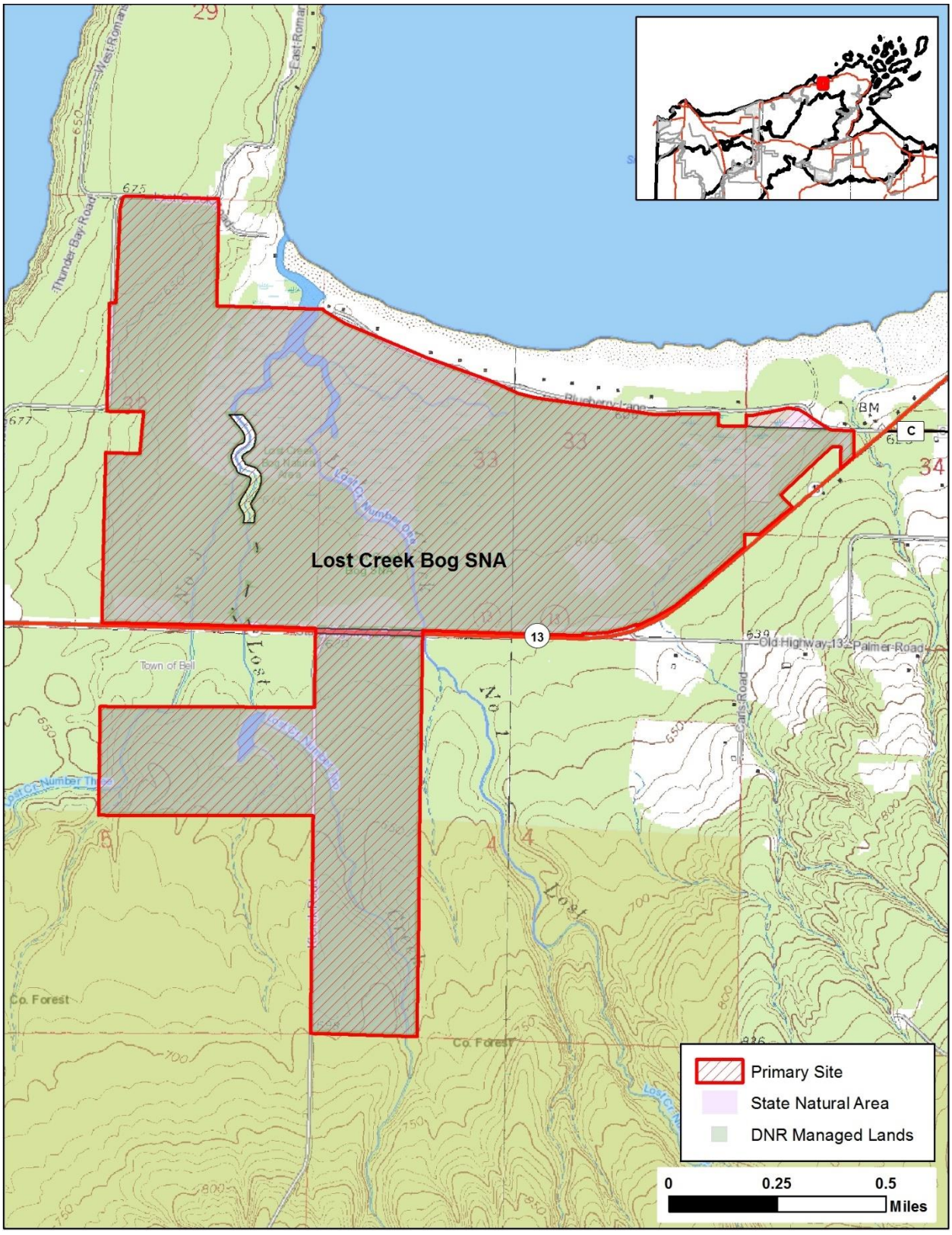
Lost Creek Bog SNA features a Lake Superior estuarine system at the drowned mouths of three small creeks (Lost Creek 1, 2, and 3) where they empty into Siskiwit Bay. A coastal barrier sand spit forested with spruce and pine separates the wetlands from the lake. Great Lakes shore fen, grading to shrub-carr, emergent marsh, and northern tamarack swamp are the major communities in the natural area. The fen is well developed on the west and north sides of the lagoon, with a mat composed of woolly sedge, bogbean, sweet gale, and cotton grass. Lost Creek 1 and 2 are flat, shallow, cold water streams with sandy bottoms that sustain a small brook trout population. Lost Creek 3 is a warm water drainage stream supporting minnows. Flora of the marsh is composed of lake sedge, water arum, marsh cinquefoil, and cat-tail. Bur-reed, water milfoil, yellow water-lily, common bladderwort, and pondweeds are among the submergent and floating-leaved species in the marsh.

Significance of Site

Lost Creek Bog is one of only four Great Lakes shore fens on state-owned lands on Lake Superior. Several rare plants and animals have been recorded in the natural area, including the largest known Wisconsin population of a state-endangered plant. Uncommon nesting birds recorded here are yellow-bellied flycatcher, golden-crowned kinglet, Nashville warbler, merlin, and several rare species. Migratory waterfowl and other water birds also make extensive use of the site. Lost Creek Bog was designated a State Natural Area in 1993 and is located within the Coastal Headlands and Estuaries COA, globally significant for its extensive shoreline and pristine wetlands and downed river mouths along the southern shore of Lake Superior (WDNR 2008). It is also part of the South Shore Wetlands IBA, known for a diverse suite of breeding birds as well as concentrations of shorebirds, diving ducks, and landbirds and raptors during migration (Steele 2007).

Management Considerations

A small area of narrow-leaved cattail (*Typha angustifolia*) and small patches of reed canary grass (*Phalaris arundinacea*) were the only non-native invasives species found during surveys of the site in 2017. The management objectives of Lost Creek Bog are to manage the site as a reserve for submergent/emergent marsh, open bog, and shore fen, as an aquatic reserve and a wetland protection site, as rare plant habitat, and as an ecological reference area. Natural processes should determine the structure of the forest and wetlands. A secondary objective is to provide opportunities for research and education on the high-quality wetlands. The native species should be managed passively, allowing nature to determine the ecological characteristics of the site. Exceptions include control of invasive plants and animals, maintenance of existing facilities, and access to suppress fires. Although removal of hazardous trees from over and near state-approved snowmobile trails is an allowed activity, manipulation/removal of vegetation and soil disturbance must be minimized and must have no impact on the rare species found at the site. This also holds true for the boat launch area. Roadside and utility easement areas may be managed sporadically by state, township and utility.



SCPEL03. Lost Creek Bog SNA Primary Site

SCPEL04. NOURSE SUGARBUSH SNA

Location

Property:	Nourse Sugarbush SNA
Landtype Association:	Bayfield Lake-Modified Till Plain (212Ka02)
Approximate Size:	439 acres

Description of Site

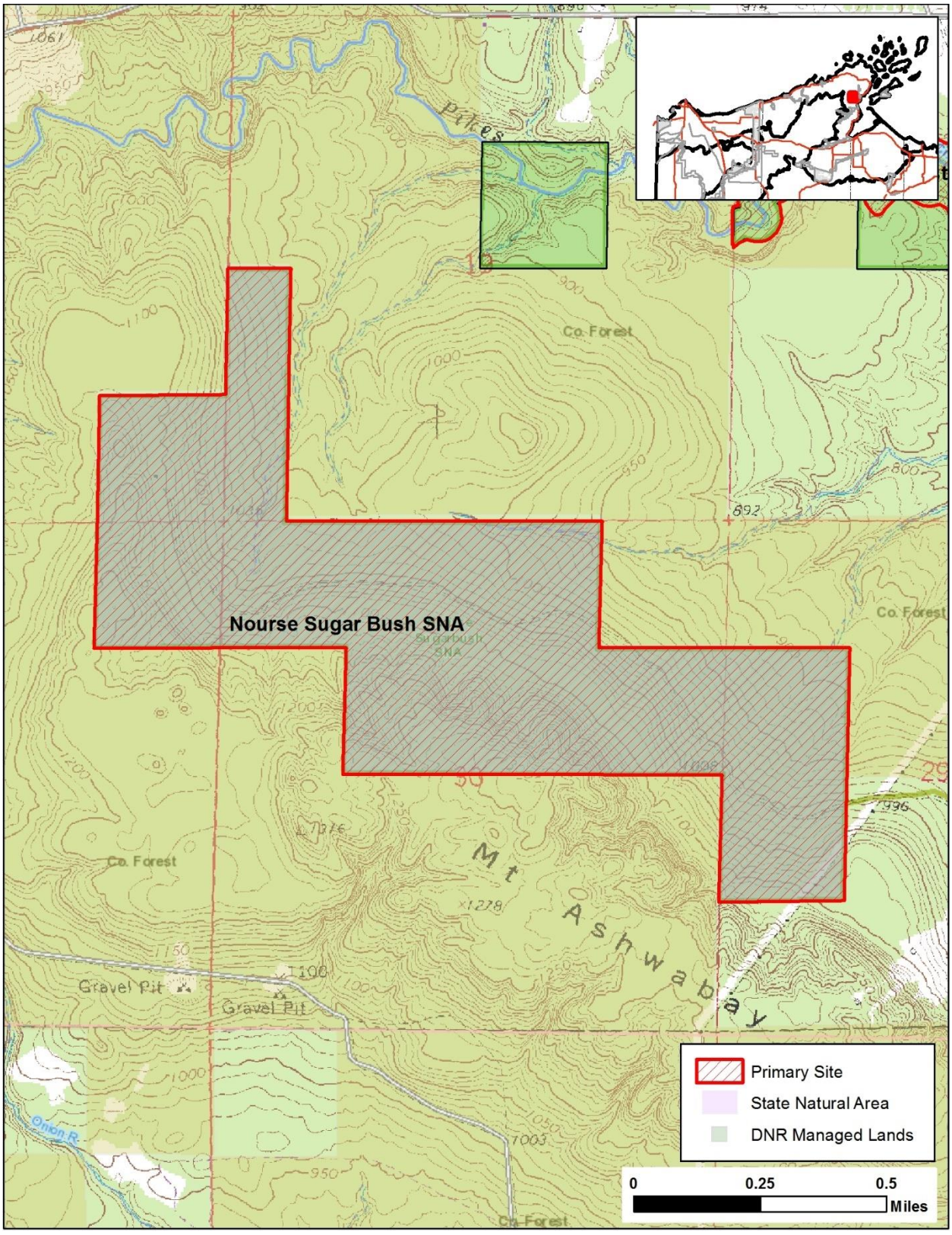
Nourse Sugarbush SNA features an old-growth northern mesic forest on the northwest flank of Mt. Ashwabay, a steep-sided hill rising over 700 feet above Lake Superior. To the south, the land rises abruptly to the Bayfield outwash sands and supports dry forest and barrens communities. In contrast, although situated on the same glacial outwash, the sugarbush developed in the shadow of Mt. Ashwabay, which protected it from fire. Large hemlock and sugar maple, some towering 100 feet high, dominate the canopy with associated species of yellow birch, basswood, paper birch, and red oak. The understory is composed of ironwood, sugar maple, and balsam fir. The shrub layer is sparse; groundcover includes wild sarsaparilla, hairy sweet cicely, doll's-eyes, rosy twisted-stalk, intermediate wood fern, partridgeberry, and violets.

Significance of Site

Nourse Sugarbush is an excellent example of an old-growth northern mesic forest, now rare on the Superior Coastal Plain. Densely packed territories of the black-throated blue warbler indicate the forest contains optimal habitat for this uncommon species. The site has a long history of maple sugaring. For hundreds of years the Ojibwe tapped the large trees for maple syrup production and diagonal slash marks from early sap collecting are still visible on some trees. Nourse Sugarbush was purchased by the Mt. Ashwabay Outdoor Education Foundation with assistance from the Bayfield Regional Conservancy and later donated to the State of Wisconsin. It was designated a State Natural Area in 2006.

Management Considerations

The previously stated site objectives are to manage the site as an old-growth northern mesic forest reserve and an ecological reference area and to provide opportunities for research and education on the highest quality northern mesic forests. Natural processes should determine the structure of the forest. Native species should be managed passively, allowing nature to determine the ecological characteristics. Portions of the site are younger forest and are designated as future old-growth that will develop through natural processes. Exceptions include control of invasive plants and animals, and maintenance of existing facilities. Salvage of trees after a major wind event is not considered compatible with management objectives, except for the removal of hazardous tree over and near trails and access roads. Utility corridor management also occurs sporadically within the utility easement area.



SCPEL04. Nourse Sugarbush SNA Primary Site

SCPEL05. UPPER PIKES CREEK BOREAL FOREST

Location

Property:	South Shore Fishery Area – Pikes Creek Unit
Landtype Association:	Bayfield Lake-Modified Till Plain (212Ka02)
Approximate Size:	532 acres

Description of Site

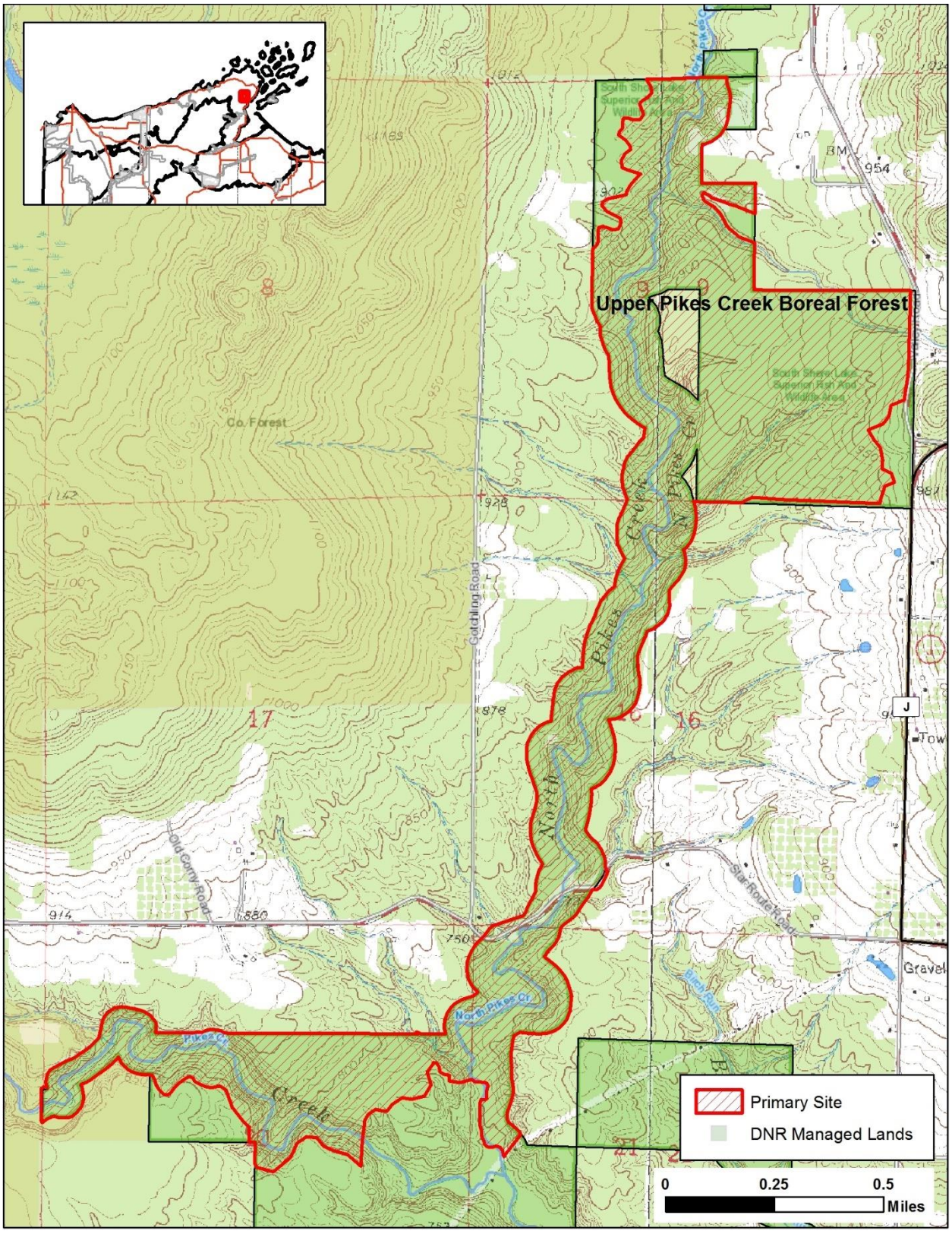
This relatively narrow stretch of forest along branches of Pikes Creek supports boreal and mesic forest as well as forested seeps and clay seepage bluffs. The terrain is rugged with extremely steep slopes and ravines cutting at angles in many places. Boreal forests are closed canopy and dominated by white pine up to three feet in diameter, along with large white-cedar and red pine, while hemlock dominates north-facing slopes. Some large aspen, white spruce, and black ash are also present. Numerous wildflowers indicative of boreal forests can be found in the groundlayer. The soil is clay, giving way to sandy silt or sandy clay on the creek terraces. Clay seepage bluffs are scattered throughout and are usually small and sparsely vegetated, but include plants such as balsam poplar, lion's-foot (*Prenanthes alba*), and golden sedge (*Carex aurea*).

Significance of Site

Though narrow, portions of this site have characteristics of an ecological reference area and contains some of the higher quality older-aged boreal and mesic forests on the Superior Coastal Plain, with pockets likely never logged due to the extremely steep topography and difficult access. The terrain also contributes to the ecological complexity of the site, with a wide variety of aspects and elevations along the slope represented. This leads to an incredible diversity of conifers in a very small area, including mature white pine, red pine, white-cedar, white spruce, hemlock, and balsam fir all co-occurring, sometimes within a few acres. The high conifer cover also contributes to maintaining high water quality in Pike Creek by intercepting rainfall, "slowing the flow" of runoff, and allowing for asynchronous snowmelt and greater groundwater infiltration in the immediate Pike Creek drainage (Jereczek et al. 2011). The site is notable for good numbers of Canada warbler, a species of concern due to steep declines in breeding numbers. Red-crossbills were also found here, a rare breeder in Wisconsin. It is likely they shifted their breeding range southward into Wisconsin in 2018 due to an abundant cone crop. Other uncommon breeders here include Cape May and blackburnian warblers, and one rare species. Small mammal surveys found good numbers of the woodland deer mouse, a species with information needs, meadow jumping mouse, and southern flying squirrel.

Management Considerations

Maintaining a mature canopy of diverse conifers and hardwoods with a complex, multi-layered canopy will help continue to provide ecological and water quality benefits. Steep slopes combined with highly erodible clay soils make mechanized equipment unsuitable in many areas, meaning passive management may be the best management option across much of the site. Where canopy is lost due to blowdown or other disturbances, underplanting desirable conifers will help maintain forest composition. Monitoring for and controlling invasive species should also be regularly conducted.



SCPEL05. Upper Pikes Creek Boreal Forest Primary Site

SCPEL06. BIG BAY SAND SPIT AND BOG AND BIG ROCK POINT

Location

Property:	Big Bay State Park
Landtype Association:	Apostle Islands (212Ic01)
Approximate Size:	1060 acres

Description of Site

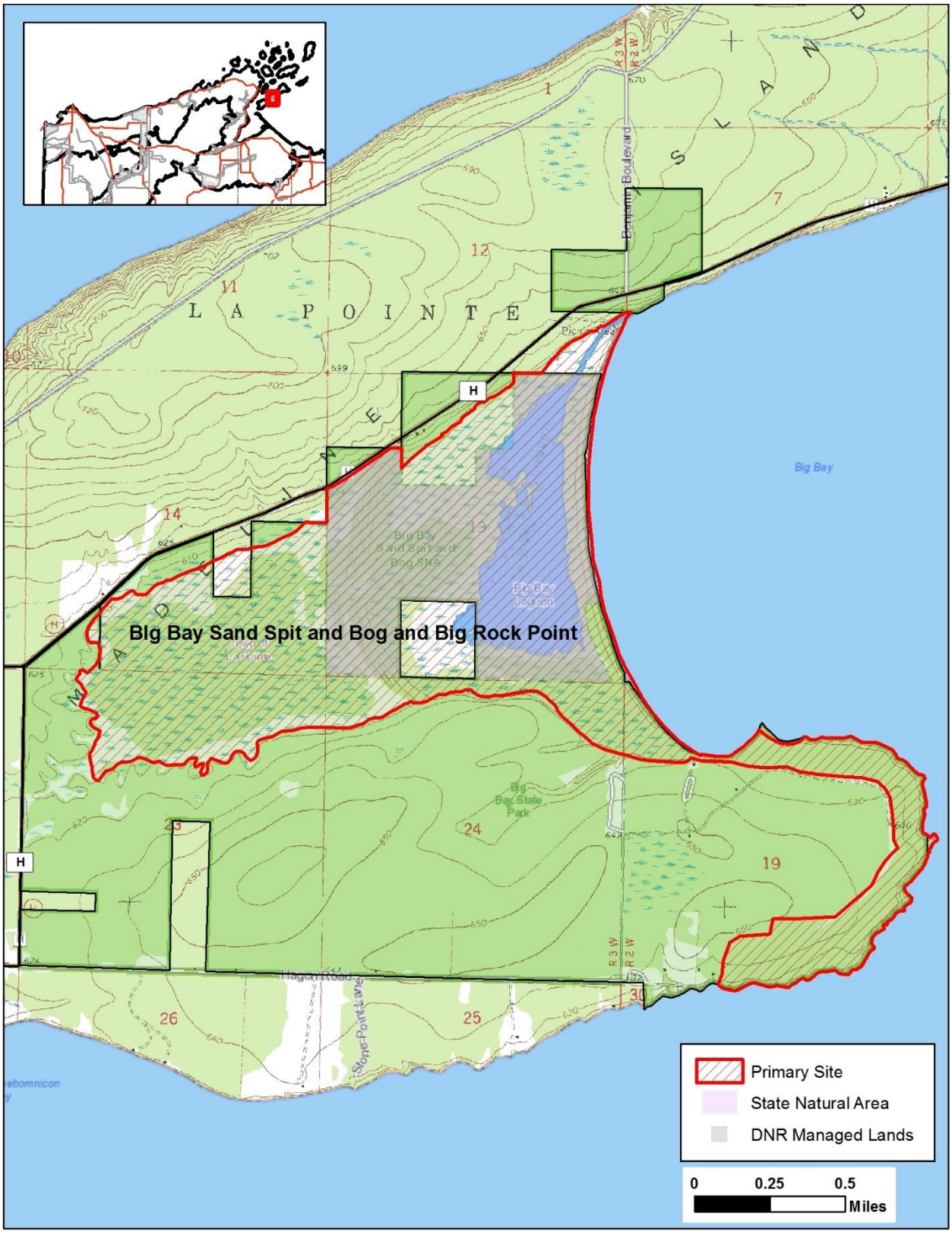
This primary site is comprised partially of Big Bay Sand Spit and Bog SNA along with adjacent areas in Big Bay State Park on Madeline Island in Lake Superior. The site features a long, curving baymouth bar behind which lies a lagoon, an extensive peatland complex and older sand ridges. Vegetation consists of submerged aquatics in the shallow water lagoon and bog shrubs on the many small islands as it grades from open water into Great Lakes shore fen on a quaking sedge mat, followed by poor fen on the older, grounded Sphagnum-sedge mat. Further inland, peatlands transition to a conifer swamp of white-cedar, black and white spruces, and tamarack, bordered by a second sand ridge of second growth boreal forest, beyond which lies a black spruce swamp. Along Lake Superior, a narrow sandscape consists of the beach, dunes and a narrow zone of Great Lakes barrens. South of the bay, the shoreline is rocky and wraps around Big Rock Point, to the west of which lies a large, mature second growth hardwood forest.

Significance of Site

This site is one of only three large, undeveloped sandspit lagoon and peatland complexes on the Apostle Islands, and the only site in state ownership. The floating mat contains one of the richest shore fen floras in the Lake Superior region and harbors populations of several rare wetlands plants, including one of the largest populations in the state of a state-threatened sedge. The site is part of the Apostle Islands National Lakeshore Important Bird Area (IBA) and includes four rare bird species (Steele 2007). Ephemeral ponds are located within the mesic forest of Big Rock Point and harbor pond obligates like blue-spotted and spotted salamander, wood frog and other frogs. A rare herptile is known from the lagoon area. The site also features approximately 2 miles of upland, undeveloped Lake Superior shoreline, an uncommon feature within Madeline Island. The site also lies with the Apostle Islands COA and is of global significance for the islands and the pristine wetlands in Lake Superior, the largest freshwater lake in the world (WDNR 2008). The portion of the site that is an SNA was designed in 1980.

Management Considerations

The central portion of the site is already designated as an SNA and is managed as an ecological reference area for wetland forest, shore fen, sand spit/dunes/beach and Great Lakes Barrens. Maintaining the hydrology of the peatland complex is of utmost importance, including the intermittent connection to Lake Superior at the north end of the complex (owned by the Town of La Pointe). Monitoring for and managing invasive species in the lagoon, dune, beach, and surrounding habitats is also crucial, especially for species with the ability to rapidly displace rare native species (e.g., Phragmites, non-native cat-tail, etc.). Quiet-water recreation by kayakers and canoeists entering the lagoon should be managed to ensure the sensitive peat soils of the floating mat are not damaged; motorized public access is incompatible with the sensitive lagoon vegetation and SNA designation.



SCPEL06. Upper Pikes Creek Boreal Forest Primary Site

SCPEL07. SIOUX RIVER BAYVIEW BEACH

Location

Property:	South Shore Fishery Area – Sioux River Unit
Landtype Association:	Bayfield Lake-Modified Till Plain (212Ya02)
Approximate Size:	119 acres

Description of Site

This wetland complex at the Sioux River mouth includes emergent marsh and alder thicket adjoining a narrow, mile-long open peaty swale between two parallel sandspits. The swale includes both a coastal poor fen as well as Great Lakes shore fen. The beach ridges are forested with white and red pines, balsam fir, and paper birch. Wetter areas support a mat of woolly sedge, with buckbean, sweet gale and water horsetail. The dominant species of the marsh at the Sioux River mouth are typical of Lake Superior stands and include bur -reeds, soft-stemmed bulrush, cattails, lake sedge, and water arum. Further inland, west of Highway 13, the marsh is heavily dominated by cattail.

Significance of Site

Five rare plants occur at the site, including a state endangered orchid that may be the only known remaining population in the state. Two rare birds have been documented here. Use of the site by migratory birds can be significant, especially in the spring. Though relatively small and constrained by the state highway and a railroad grade, this site contains significant wetland communities.

Management Considerations

Threats to the site include the spread of Phragmites and cat-tail, disruption of hydrology and water chemistry, and maintenance activities on Highway 13. The Phragmites and cattail observed in the peaty swale in 2018 were native but can still be aggressive and may indicate eutrophication from run-off. Recommendations include periodic monitoring of water quality and invasive plant species as well as follow-up management if Phragmites and cattail encroachment appears to be displacing other native species. High lake levels also play a role in the establishment of these species, however, so determining the factors (run-off vs. naturally high lake level) leading to their spread is important before management is considered.

SCPEL07. Sioux River Bayview Beach Primary Site

SCPEL08. UPPER SIOUX RIVER BIG ROCK PINES

Location

Property:	South Shore Fishery Area – Sioux River Unit
Landtype Association:	Bayfield Lake-Modified Till Plain (212Ya02)
Approximate Size:	159 acres

Description of Site

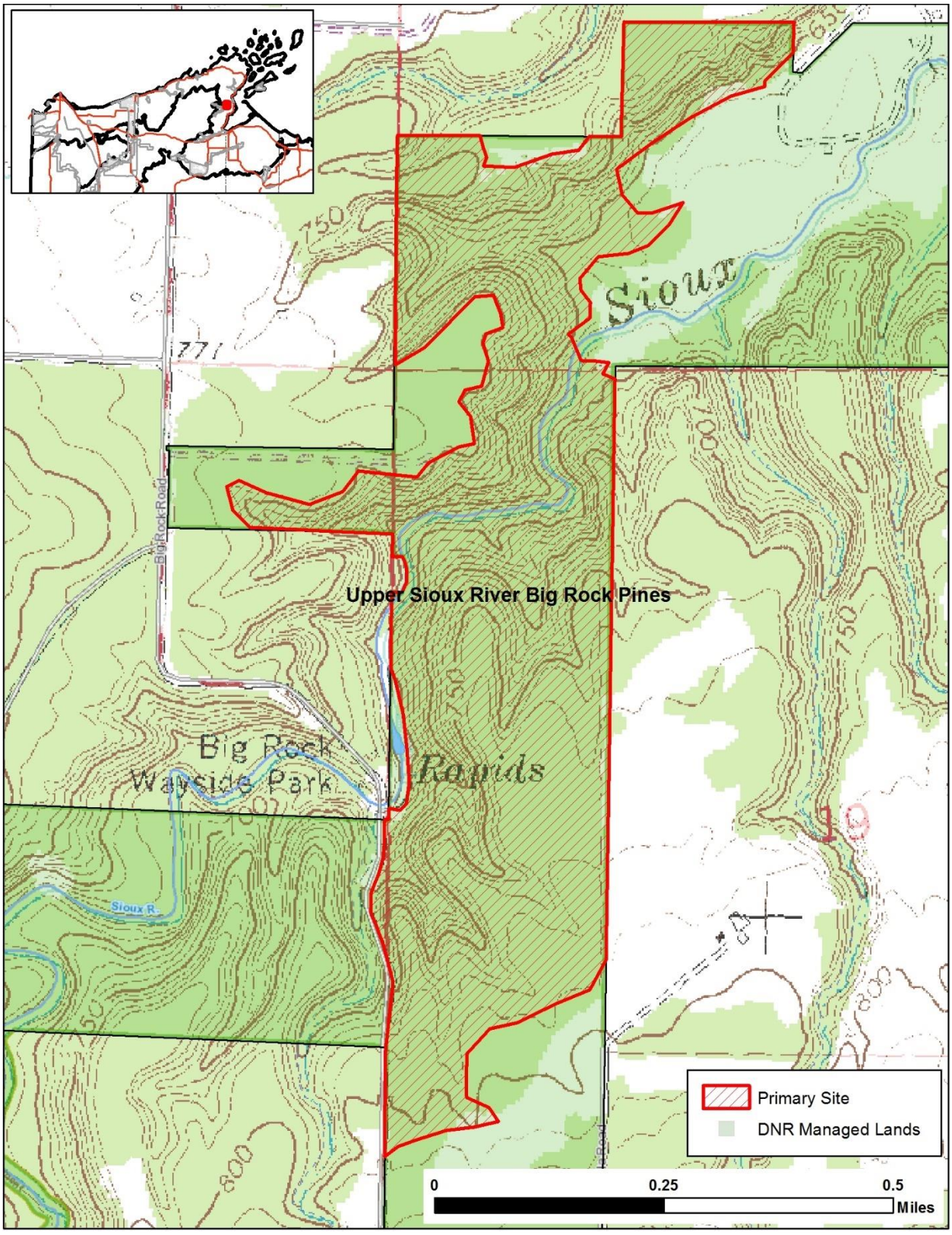
A high-quality northern dry-mesic forest surrounds a relatively narrow stretch of the upper Sioux River near Big Rock campground, a county park adjacent to state land. The site is notable for its topographic and ecological complexity, with numerous natural community inclusions embedded within the larger dry-mesic forest matrix. Large red and white pine dominate the stands, though boreal species like mountain maple and white-cedar are found in the rocky ravines, and shallow depressions perched on the flatter tops are dominated by black ash. Clay seepage bluffs are found amongst the forest stands and a few forested seeps are found toward the slope bottoms. The site is situated on a lacustrine moraine below the sandy Moquah barrens region to the west and therefore has mainly clay soils, though hilltop knobs are sandy.

Significance of Site

This site has characteristics of an ecological reference area. It encompasses a relatively large block of mature, natural-origin red and white pine forest, which is rare throughout northern Wisconsin, particularly on the Superior Coastal Plain. The stand is nearly 120 years old, with some trees likely older. The mature forest in conjunction with the ravines, forested seeps, clay seepage bluffs, and river corridor create a unique juxtaposition of high-quality communities. Mature conifer cover also contributes to maintaining high water quality in the Sioux River by intercepting rainfall, "slowing the flow" of runoff, and allowing for asynchronous snowmelt and greater groundwater infiltration in the immediate Sioux River drainage (Jereczek et al. 2011). A rare mayfly and a rare stonefly have been documented from this site, and the river corridor also likely provides a foraging corridor for bats, though no surveys were conducted. The site hosts some uncommon birds such as Canada warbler, and during irruption years like 2018, red crossbill. The crossbills prefer large pines, while Canada warblers are drawn to the sloped riparian areas with dense understory. The site also hosts a nice community of warblers that prefer large conifers, such as black-throated green, pine, blackburnian, and northern parula, while brown creeper and winter wren are also noteworthy.

Management Considerations

Management that focuses on maintaining stands of older age-class pine will continue to provide ecological and water quality benefits. Invasive species monitoring and control is needed. Common buckthorn and honeysuckle occur in at least one small area, and bird's-foot trefoil is common on clay seepage bluffs.



SCPEL08. Upper Sioux River Big Rock Pines Primary Site

SCPEL09. FISH CREEK ESTUARY

Location

Property:	South Shore Fishery Area – Fish Creek Unit
Landtype Association:	Ashland Lake-Modified Till Plain (212Ya03)
Approximate Size:	521 acres

Description of Site

The drowned mouth of Fish Creek and its associated wetlands occupy the head of Chequamegon Bay. This wetland is particularly dynamic, owing to the funnel shape of Chequamegon Bay and the seiche activity that causes frequent and sometimes substantial short-term water level changes. The primary wetland communities are emergent marsh, shrub swamp, and hardwood swamp. The open waters of the sloughs also constitute an important feature. The emergent marsh occupies several hundred acres close to the creek mouth. Dominants include bur-reeds, bulrushes, lake sedge, arrowhead and water sedge. Beds of submergent and floating-leaved aquatic macrophytes occur in the open waters of the sloughs and intermingle with the emergents where conditions are suitable. The marsh grades into a shrub swamp willows and speckled alder, many of which have been killed by recent high water levels. An extensive forest of swamp hardwoods dominated by black and green ash lies on the southern portion of the site. Near the mouth of Fish Creek, flats of sand and mud exposed when the water level is low are used heavily by waterfowl, gulls, terns, and shorebirds as loafing or feeding sites.

Significance of Site

With over 300 acres of wetlands, Fish Creek is the largest freshwater estuary complex in Chequamegon Bay. In addition to providing valuable ecosystem services for water quality, it also serves as an important spawning and nursery habitat for fish, stopover habitat for migrating birds, and breeding habitat for several rare marsh birds as well as a rare herptile. It also supports a state-threatened plant. Due to the vast wetlands of the site, it is an important part of the Lower Chequamegon Bay IBA recognized for its importance as a staging and stopover area for migratory shorebirds, waterfowl, and waterbirds as well as coastal wetland, beach, and open water breeding habitat for large numbers of birds (Steele 2007). The site is also part of the Fish Creek COA, of state significance for its extensive good-quality wetlands which support numerous SGCN (WDNR 2008).

Management Considerations

Located on the outskirts of the City of Ashland and crossed by U.S. Highway 2, this site has been subjected to many disturbances in the past and remains vulnerable to further deterioration unless efforts to address problems are maintained. Efforts to maintain the functional values of this site should continue, as Fish Creek Sloughs are important wildlife and fish habitat. Maintaining the hydrology of all portions of the wetland complex is crucial, including allowing for seiches as well as longer-term fluctuations in Lake Superior water levels. An old access road runs adjacent to the site north of US-2 and east of Highway 13. Plans are underway to install culverts through the roadbed to restore wetland hydrology to this area just outside the primary site. Invasive species monitoring and control is also a critical management need. The loss of ash from Emerald Ash Borer (EAB) is likely, and a proactive management plan should be developed and implemented to retain forested cover and minimize the risk of conversion of ash forests to alder or reed canary grass. Garden valerian (*Valeriana officinalis*) is present in the ash swamp, though the colonies are few and the population is currently low. A large powerline corridor runs just south of the site and should be monitored for invasive species like reed canary grass and Phragmites, and populations controlled when found.

SCPEL09. Fish Creek Estuary Primary Site

Future Needs

This project was designed to provide a biotic inventory of the biodiversity values for the Superior Coastal Plain Ecological Landscape. Although the report should be considered adequate for master planning purposes, additional efforts could help to inform future adaptive management efforts, along with providing useful information regarding the natural communities and rare species of the SCP EL.

Invasive Species

- Early detection and rapid response to high-threat invasive species should continue. This is especially important as the level of infestation of many species in the SCP is relatively low relative to other ecoregions, making early detection and rapid response highly cost-effective compared to waiting until invasives are well-established on the landscape.
- Conduct regular monitoring for aquatic invasive species, especially in sensitive coastal wetlands that receive a high level of recreational use such as Port Wing Boreal Forest SNA, Bark Bay Slough SNA, Lost Creek SNA, and Big Bay State Park.
- Emerald ash borer was detected in Superior in 2013 and in the Town of Amnicon in 2017. The spread of EAB and the eventual loss of ash throughout the SCP EL is virtually certain. An inventory of ash-dominated forests is needed along with pro-active management to reduce the risk of forest conversion. Ash-dominated wetlands are especially at risk of conversion to alder or reed canary grass. Underplanting of other deciduous wetland trees such as swamp white oak has been trialed elsewhere in the state as a means of maintaining wetland forests, desired wildlife habitat and good water quality.

Natural Communities

- Monitor wetlands sensitive to nutrient enrichment and invasive species such as poor fens, Great Lakes shore fens, northern sedge meadows, northern tamarack swamps, wild rice marshes, and northern hardwood swamps using timed meander surveys.
- Research sources of nutrients and sediments that threaten key estuaries and wetland complexes and take steps to reduce nutrient and sediment loading where feasible.
- Monitor boreal and northern dry-mesic forest restorations for invasive species, conifer planting survival, and desired long-term impact on wildlife habitat and water quality, such as slowing the flow of snowmelt and precipitation runoff, and reducing stream peak flows, slope failure, and sedimentation (Jereczek et al. 2011).
- Continue to document high-quality clay seepage bluffs to better inform the plant species composition, ecology, characteristics, and conservation needs of this under-studied community.

Birds

- Conduct specialized surveys to locate additional populations of marsh birds (e.g., yellow rail, American bittern), which are associated with the Superior Coastal Plain.
- Continue and expand migratory bird survey efforts to locate and quantify important stopover sites along the Lake Superior coast.
- Continue efforts to create and protect colonial waterbird (e.g. terns) nesting sites around Lake Superior.
- Monitor and manage piping plover nest sites within the Superior Coastal Plain, the best location in the state for this species.

Small Mammals

- A limited effort was undertaken to survey for small mammals during this biotic inventory. Continue small mammal surveys throughout the Ecological Landscape to inventory for rare woodland SGCN (e.g., northern flying squirrel). Monitoring the northward movement of southern flying squirrel and white-footed mouse is important; both of these species were found during 2018 surveys here. These species have been found to exclude uncommon compatriot species such as northern flying squirrel and woodland deer mouse, making the northward expansion of the former species cause for concern.
- Conduct surveys of brushy grasslands and shoreline dunes and barrens for Franklin's ground squirrel.

Herptiles

- Initiate monitoring of wood turtle in rivers and implement nest site protection where appropriate.
- Expand inventory efforts for mink frogs via breeding call surveys.
- Conduct inventory of four-toed salamander within springs, spring creeks, spring-fed bogs, and ephemeral ponds in mesic forest associations.
- Conduct amphibian egg mass surveys in ephemeral ponds to better document which ponds are significant breeding areas for wood frogs and salamanders.

Invertebrates

- Conduct inventory for bees, especially the yellow-banded bumblebee (*Bombus terricola*) and indiscriminate cuckoo bumblebee (*B. insularis*).
- Conduct inventory for tiger beetles associated with Great Lakes beaches.
- Monitor eastern elliptio and other mussel species populations in state properties along the St. Louis estuary.
- Inventory mussel beds, especially the eastern elliptio in cool-warm mainstem streams that intersect state properties.

Rare Plants

- Monitor population levels and, where feasible, take steps to reduce immediate threats to extremely rare species associated with the SCP EL, including fly honeysuckle (*Lonicera involucrata*), auricled twayblade (*Listera auriculata*), and northern oak fern (*Gymnocarpium jessoense* var. *parvulum*).
- Conduct additional surveys for tea-leaved willow, a rare species that may be under-reported in the region.
- Conduct regular monitoring of rare plants associated with red clay wetlands near the city of Superior.

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